

# Maths Progression Documents



# Maths Progression – National Curriculum (4 Operations)

ADDITION

<ul style="list-style-type: none"> <li>read and write addition (+) and equals (=) signs</li> <li>represent and use number bonds and facts within 20</li> <li>add one-digit and two-digit numbers.</li> </ul>	<ul style="list-style-type: none"> <li>recall addition facts to 20, use related facts up to 100</li> <li>add numbers using concrete objects, pictorial representations, including: two-digit number and 1s, two-digit number and 10s, 2 two-digit numbers, adding 3 one-digit numbers</li> </ul>	<ul style="list-style-type: none"> <li>add numbers mentally, including: three-digit number and 1s, a 3-digit number and 10s, a three-digit number and 100s</li> <li>add numbers with 3 digits, using formal written methods of columnar addition</li> </ul>	<ul style="list-style-type: none"> <li>add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate</li> </ul>	<ul style="list-style-type: none"> <li>add whole numbers with more than 4 digits, including using formal written methods (columnar addition)</li> </ul>	<ul style="list-style-type: none"> <li>solve addition multi-step problems in contexts, deciding which operations and methods to use and why</li> </ul>
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

SUBTRACTION

<ul style="list-style-type: none"> <li>solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why</li> </ul>	<ul style="list-style-type: none"> <li>subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)</li> </ul>	<ul style="list-style-type: none"> <li>subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate</li> </ul>	<ul style="list-style-type: none"> <li>Subtract numbers mentally, including: a three-digit number and 1s, a three-digit number and 10s, a three-digit number and 100s</li> <li>subtract numbers with 3 digits, using formal written methods of columnar</li> </ul>	<ul style="list-style-type: none"> <li>recall subtraction facts to 20, use related facts up to 100</li> <li>subtract numbers using concrete objects, pictorial representations, including: two-digit number and 1s, two-digit number and 10s, 2 two-digit numbers, subtract 3</li> </ul>	<ul style="list-style-type: none"> <li>Read and write subtraction (-) and equals (=) signs</li> <li>represent and use number bonds and related subtraction facts within 20</li> <li>subtract one-digit and two-digit numbers.</li> </ul>
Year 6	Year 5	Year 4	Year 3	Year 2	Year 1

MULTIPLICATION

<ul style="list-style-type: none"> <li>solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher</li> </ul>	<ul style="list-style-type: none"> <li>recall and use multiplication facts for the 2, 5 and 10 multiplication tables, recognise odd and even numbers</li> <li>calculate mathematical statements for multiplication and write them using the multiplication (x) and equals (=) signs</li> </ul>	<ul style="list-style-type: none"> <li>recall multiplication facts for the 3, 4 and 8 x tables</li> <li>write and calculate mathematical statements for multiplication using the multiplication tables, including for two-digit numbers times one-digit numbers, progress to formal written methods</li> </ul>	<ul style="list-style-type: none"> <li>multiply two-digit and three-digit numbers by a one-digit number using formal written layout</li> <li>learn all times tables</li> </ul>	<ul style="list-style-type: none"> <li>multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers</li> <li>include decimals</li> </ul>	<ul style="list-style-type: none"> <li>multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication</li> </ul>
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

DIVISION

<ul style="list-style-type: none"> <li>divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders</li> </ul>	<ul style="list-style-type: none"> <li>divide numbers up to 4 digits by a one-digit number using the formal written method of short division</li> <li>Include decimals</li> </ul>	<ul style="list-style-type: none"> <li>recall division facts for multiplication tables up to <math>12 \times 12</math></li> <li>use place value, known and derived facts to divide mentally, including: dividing by 10 and 100, dividing by 2, 3, 4, 5, 8 and 10</li> </ul>	<ul style="list-style-type: none"> <li>recall and use division facts for the 3, 4 and 8 multiplication tables</li> <li>write and calculate mathematical statements for division using the multiplication tables, progressing to formal written methods</li> </ul>	<ul style="list-style-type: none"> <li>recall and use division facts for the 2, 5 and 10 tables</li> <li>calculate mathematical statements for division and write them using the division (<math>\div</math>) and equals (=) signs</li> </ul>	<ul style="list-style-type: none"> <li>solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations with the support of the teacher</li> </ul>
Year 6	Year 5	Year 4	Year 3	Year 2	Year 1



# Maths calculation Progression – What it looks like

Addition

<p>Using a number line to add two numbers together. 8 + 1 = 9</p>	<p>34 + 23 = 57</p>	<p>876 + 555 ----- 1431</p>	<p>5209 + 3192 ----- 8401</p>	<p>58,391 + 27,431 ----- 85,822</p>	<p>8,391 + 2,431 ----- 8,822</p> <p>Abdul says "If I add any two 4 digit numbers together it will make a 5 digit number." Do you agree? Explain why.</p>
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

Subtraction

<p>87 - 19 ----- 68</p> <p>Katie was given the calculation below 47326 - 1900 = She said "I will just take off 2000 then subtract another 100 so my answer is 45126." Is she correct? Would you use her method? Explain your answer.</p>	<p>87 - 19 ----- 68</p>	<p>98126510 - 6702 ----- 97456310</p>	<p>958 - 226 ----- 732</p>	<p>47 - 23 = 24</p>	<p>Using a number line to take away/subtract 6 - 3 = 3 13 - 5 = 8</p>
Year 6	Year 5	Year 4	Year 3	Year 2	Year 1

Multiplication

<p>2x, 10x 5x</p>	<p>2x, 10x 5x, 3x</p>	<p>4012 = 52</p> <p>3x, 4x, 8x</p>	<p>All times table 883 x 9 ----- 7947</p>	<p>2826 x 8 ----- 22608</p>	<p>A class are solving multiplication problems using counters. One child arranges their counters like the diagram below. The question is 23 x 3 = Is this the only way to represent this calculation? How many ways can you find?</p>
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

Division

<p>526 ÷ 25 = ? 25   526 - 50 -- 26 - 25 -- 1 ----- 21 r 1</p> <p>Answer: 526 ÷ 25 = 21 r 1</p>	<p>604916</p>	<p>Exchanging a 10 for ten 1s</p>	<p>Jenny is using place value counters to work out: 62 ÷ 2 = 31</p>	<p>solve problems involving division, using materials, mental methods, and division facts, including problems in contexts</p>	<p>solve one-step problems involving division, by calculating the answer using concrete objects/pictorial representations with the support of the teacher</p>
Year 6	Year 5	Year 4	Year 3	Year 2	Year 1

**Pear Tree Junior School Fluency Curriculum: Progression of Key Strategies**

Addition and Subtraction Strategies			
<b>Counting Forwards And Backwards</b> Pupils extend their sense of number by beginning at different numbers and counting forwards and backwards in steps, not only of ones, but also of twos, fives, tens, hundreds, tenths and so on.		Examples	
1	Count on or back in ones from any <u>two-digit</u> number	$4 + 5$	$17 - 3$
2	Counting on or back in tens from any number	$23 + 5$	$27 + 60$
3	Counting on or back in fives from any multiple of 5	$35 + 15$	$60 - 25$
3	Counting on or back in hundreds from any number	$570 + 300$	$1,900 + 400$
5	Counting on or back in tenths and/or hundredths	$3.2 + 0.6$	$1.7 + 0.55$
<b>Partitioning &amp; Bridging</b> It is important that children are aware that numbers can be partitioned - both along the place value boundaries (canonically) and in other ways (non-canonically). Children should also use 'bridging' where appropriate.		Examples	
2	Calculations with whole numbers which do not involve crossing place value boundaries	$30 + 47$ $23 + 45$	$34 + 23$
4	Calculations with whole numbers which involves crossing place value boundaries	$49 - 32$ $447 + 58$	$276 - 260$ $57 - 34$
5	Calculations with decimal numbers which do not involve crossing place value boundaries	$5.6 + 3.2$ $4.7 - 3.5$	$21.34 + 3.17$
5	Calculations with decimal numbers which involve crossing place value boundaries	$1.4 + 1.7$ $5.7 + 6.9$	$0.8 + 0.35$
<b>Compensating And Adjusting</b> Compensation involves adding more than you need and then subtracting the extra off that you have added.		Examples	
2	Compensating and adjusting to 10	$34 + 9$ ( $34 + 10 - 1$ ) $37 - 9$ ( $37 - 10 + 1$ )	
3	Compensating and adjusting near multiples of 10	$38 + 68$ ( $38 + 70 - 2$ ) $45 - 29$ ( $45 - 30 + 1$ )	
4	Compensating and <u>adjusting near</u> multiples of 10 or 100	$138 + 69$ ( $138 + 70 - 1$ ) $299 - 48$ ( $300 - 48 - 1$ ) $235 + 198$ ( $235 + 200 - 1$ ) $607 - 588$ ( $607 - 600 + 12$ )	
5	Compensating and adjusting near whole numbers	$2\frac{1}{2} + 1\frac{1}{2}$ ( $2\frac{1}{2} + 2 - \frac{1}{2}$ ) $5.7 + 3.9$ ( $5.7 + 4.0 - 0.1$ )	
<b>Calculating Using Near Doubles</b> When children have an automatic recall of basic double facts, they can use this information when adding two numbers that are <u>very close</u> to each other.			
1	Near doubles to 10	$6 + 7$	$7 + 8$
2	Near doubles of multiples of 10 numbers under 50	$18 + 16$	$39 + 40$
4	Near doubles of multiples to 10	$60 + 70$ $160 + 170$	$76 + 75$ $29 + 31$
5	Decimal near doubles to whole numbers	$2.5 + 2.6$	$3.8 + 4.1$
<b>Bridging Through 60 to Calculate a Time Interval</b> Time is a universal non-metric measure.			
3	To count forwards or backwards in steps of 15, 30 or whole hours from quarter-past, half-past and quarter-to, bridging through 60	It is 3.45pm. How many minutes to 4.15pm?	
4	To count forwards or backwards in steps of 5 and 10 from any time that is a multiple of 5 (2.05pm, 8.35am), bridging through 60	What is the time 50 minutes before 1.10pm?	
5	To count on or back in minutes and hours, bridging through 60	It is 4.18pm. My train leaves at 5.26pm. How long must I wait?	

**Pear Tree Junior School Mental Fluency Curriculum: Progression of Key Strategies**

Multiplication and Division Strategies			
<b>Place Value Multiplication Strategies</b> Children should be able to build upon their rapid recall of multiplication and division facts and use partitioning to solve calculations of increasing complexity			
4	Multiply a 2-digit number by a single digit by partitioning	$26 \times 3$	$17 \times 3$
5	Use place value to derive multiplication and division facts involving decimals	$0.6 \times 8$	$3.5 \div 7$
6	Multiply decimals numbers up to 2 decimal places by whole numbers	$3.42 \times 4$	$5.09 \times 7$
<b>Doubling And Halving Strategies</b> Children should be able to recognise halving as the inverse of doubling and be able calculate doubles and halves of numbers.			
2	Double multiples of 5 and 10 to 50 and the corresponding halves	Double 35	Half 70
3	Double multiples of 5 and 10 to 100 and the corresponding halves	Double 85	Half 170
4	Doubles and halves of any two-digit number and any multiple of 10 or 100	Half 680	Double 73
4	Form equivalent calculations and use doubling and halving: multiply by 4 by doubling twice, multiply by 8 by doubling three times, divide by 4 by halving twice, divide by 8 by halving three times	$16 \times 4 = 32 \times 2 = 64$ $12 \times 8 = 24 \times 4 = 48 \times 2 = 96$ $104 \div 4 = 52 \div 2 = 26$ $104 \div 8 = 52 \div 4 = 26 \div 2 = 13$	
5	Form equivalent calculations and use doubling and halving: multiply by 5 by multiplying by 10 then halving multiply by 20 by doubling then multiplying by 10 multiply by 50 by multiplying by 100 and halving	$18 \times 5 = 180 \div 2 = 90$ $45 \times 20 = 90 \times 10$ $8 \times 50 = 8 \times 100 \div 2$	
6	Divide a multiple of 25 by 25 dividing by 100 then multiplying by 4	$350 \div 25 = 350 \div 100 \times 2 \times 2$	
6	Divide a multiple of 50 by 50 by dividing by 100 then doubling	$450 \div 50 = 450 \div 100 \times 2$	
6	Find the doubles and halves of any number up to 10,000 by partitioning	Half 32, 022	
6	Double and half decimal number with up to one decimal place by partitioning	Half 8.4	Double 9.6
<b>Multiplying and dividing by multiples of 10</b> Being able to multiply by 10 and multiples of 10 depends on an understanding of place value and knowledge of multiplication and division facts.			
3	Multiply a one or two-digit number by 10 or 100	$37 \times 10$	$47 \times 100$
3	Change pounds to pence	$\pounds 1.50 = 150\text{p}$	$\pounds 3.35 = 335\text{p}$
4	Multiply numbers to 1000 by 10 and then 100	$325 \times 10$	$54 \times 100$
4	Divide numbers to 1000 by 10 and then 100 (whole number answers)	$500 \div 100$	$850 \div 10$
4	Multiply a multiple of 10 to 100 by a single-digit number	$60 \times 3$	$50 \times 7$
4	Conversions: • hours to minutes • centimetres and millimetres; centilitres and <u>millilitres</u> ; • metres and centimetres; pence to pounds	1 hour 15 minutes to minutes 35 cm to 350 mm; 450 cl to 4500 ml 500 cm to 5m; $\pounds 5.99$ to 599p	
5	Use multiplication facts to derive products and related division facts to multiply and divide by multiples of 10 and 100	$900 \times 8$ $60 \times 30$ $300 \times 500$	$600 \div 20$ $800 \div 400$ $2100 \div 300$
5	Multiply and divide whole numbers and decimals by 10, 100 or 1000	$4.3 \times 100$	$25 \div 10$
5	Convert larger to smaller units of measurement using decimals to two places	1.2 m to 120 cm	2.75 l to 2750 ml
<b>Fractions, decimals and percentages</b> Children need an understanding of how fractions, decimals and percentages relate to each other			
2	Find half of any even number to 40 or multiple of 10 to 100	Half 80	Half 26
3	Find half of any multiple of 10 up to 200	Half 170	Half 190
3	Find half of any even number up to 200	Half 148	Half 196
4	Find unit fractions and simple non-unit fractions of whole numbers	$\frac{2}{8}$ of 24	$\frac{1}{5}$ of 35
6	Find 10% or multiples of 10% of whole numbers and quantities	30% of $\pounds 50$	40% of 200g
6	Find 50% by halving and 25% of numbers and quantities	25% of 150kg	50% of $\pounds 900$